

Two new species in the bamboo-feeding genus *Tiaobeinia* (Hemiptera: Cicadellidae: Deltocephalinae) from China

Mengshu SHEN, Wu DAI^①

Key Laboratory of Plant Protection Resources and Pest Management of Ministry of Education, College of Plant Protection, Northwest A&F University, Yangling, Shaanxi 712100, China

Abstract: Two new species of Mukariini, *Tiaobeinia coarseata* **sp. nov.** from Shaanxi and *Tiaobeinia yuani* **sp. nov.** from Gansu, are described. Detailed morphological descriptions and illustrations of these new species are given. A checklist of all known species in this tribe from China is provided and a key is proposed for all species of *Tiaobeinia*.

Key words: Auchenorrhyncha; taxonomy; key

中国条背叶蝉属二新种（半翅目：叶蝉科：角顶叶蝉亚科）

沈梦姝，戴武^①

植保资源与病虫害治理教育部重点实验室，西北农林科技大学植物保护学院，陕西 杨凌 712100

摘要：记述额垠叶蝉族中国2新种：陕西的宽腹条背叶蝉 *Tiaobeinia coarseata* **sp. nov.** 和甘肃的袁氏条背叶蝉 *Tiaobeinia yuani* **sp. nov.**。文中提供了详细的特征描述和外部形态及生殖器特征图，给出了条背叶蝉属分种检索表，并提供了额垠叶蝉族中国种类名录。

关键词：头喙亚目；分类；检索表

Introduction

The leafhopper subfamily Deltocephalinae is comprised of more than 7200 described species grouped in 40 tribes, and forms the largest subfamily of Cicadellidae (Oman *et al.* 1990; Zahniser & Dietrich 2013; Cao *et al.* 2022). The tribe Mukariini is a small group of Deltocephalinae, which includes 17 genera and 86 species, and is distributed in Palearctic, Afrotropical and Oriental Regions. This tribe is characterized by the produced head and thorax, often with the frontoclypeus tumid distally, ventral part of face flat and lying nearly horizontally or concave, and ocelli distant from eyes, forming a continuous curve with the strongly declivous anterior part of the pronotum (Evans 1947; Linnavuori & Quartau 1975; Dietrich 2005; Zahniser & Dietrich 2013). All known hosts are bamboos. Up to now, there have been 36 known species in 12 genera from China in this tribe.

The genus *Tiaobeinia* was erected for two species, *Tiaobeinia bisubula* Chen & Li from Guizhou and *Tiaobeinia emeiensis* Chen & Li from Sichuan, China (Chen *et al.* 2008). However, the latter species lacked any critical study of male specimens and no identity based

Accepted 29 April 2024. Published online 20 September 2024.

① Corresponding author, E-mail: daiwu@nwsuaf.edu.cn

on male genitalia was made at that time. Subsequently, Chen *et al.* (2012) provided the description and illustration for the male genitalia of *T. emeiensis* and described another species, *Tiaobeinia wantuia*, from Guizhou. During our ongoing study of the Chinese Deltocephalinae, we found two additional new species, which are described in this paper. A checklist of the tribe and a key to distinguish all five species of *Tiaobeinia* are provided. Illustrations of new species are given.

Morphological terminology follows Zahniser and Dietrich (2013). Specimens examined are housed in the Entomological Museum of Northwest A&F University.

Taxonomy

Checklist of Mukariini from China

Agrica Strand 1942: 393.

Type species: *Horvathiella arisana* Matsumura, by original designation.

A. arisana (Matsumura, 1914: 234) — China (Taiwan).

A. bisubula Luo, Yang & Chen, 2018a: 79 — China (Guizhou, Sichuan).

A. longispina Luo, Yang & Chen, 2018a: 81 — China (Guizhou).

Bambusimukaria Yang, Chen & Li, 2016: 32.

Type species: *Bambusimukaria quinquepunctata* Yang, Chen & Li, by original designation.

B. quinquepunctata Yang, Chen & Li, 2016: 78 — China (Yunnan, Guizhou, Fujian).

Flatfronta Chen & Li, 1997: 169.

Type species: *Flatfronta pronga* Chen & Li, by original designation.

F. pronga Chen & Li, 1997: 169 — China (Jiangxi, Fujian, Guangdong, Guizhou, Yunnan).

Mohunia Distant 1908: 269.

Type species: *Mohunia splendens* Distant, by original designation.

M. bifasciana Li & Chen, 1998: 123 — China (Guizhou, Yunnan).

Mukaria Distant 1908: 269.

Type species: *Mukaria penthimioides* Distant, by original designation.

M. albinotata Cai & Kuoh, 1996: 187 — China (Chongqing, Sichuan, Guizhou, Hainan).

M. creagra Zhao, Luo & Chen, 2024: 261 — China (Guizhou).

M. flavida Cai & Kuoh, 1996: 188 — China (Yunnan).

M. lii Yang & Chen, 2011: 30 — China (Guizhou, Yunnan).

M. maculata (Matsumura, 1912: 281) — China; Indonesia; Japan.

M. nigra Kuoh & Kuoh, 1983: 78 — China (Fujian, Guizhou).

M. striola Zhao, Luo & Chen, 2024: 263 — China (Yunnan).

Mukariella Viraktamath & Webb, 2019

Type species: *Mukariella daii* Viraktamath & Webb, by original designation.

M. bambusana (Li & Chen, 1998: 117) — China (Guizhou, Yunnan, Guangdong).

M. pallipes (Li & Chen, 1998: 119) — China (Guizhou, Fujian, Hunan, Fujian).

M. testacea (Chen, Liang & Li, 2009: 144) — China (Guangdong).

M. yanheensis (Chen, Yang & Li, 2012: 76) — China (Guizhou).

Myittana (*Benglebra*) Mahmood & Ahmed, 1969: 86–87

Type species: *Benglebra alami* Mahmood & Ahmed, 1969, by original designation.

M. (B.) biflaka Luo, Yang & Chen, 2019: 165 China (Yunnan).

M. (B.) curvata Luo, Yang & Chen, 2019: 167 — China (Yunnan).

M. (B.) dongae Zhao, Luo & Chen, 2023 in Zhao, Luo, Yang, Long, Chang & Chen, 2023: 85 — China (Guangxi).

M. (B.) introspina (Chen & Yang, 2007 in Chen, Li & Yang, 2007: 372) — China (Guizhou, Yunnan).

M. (B.) ventrospina (Chen & Li, 2007 in Chen, Li & Yang, 2007: 372) — China (Guizhou).

M. (B.) weiningensis Zhao, Luo & Chen, 2023 in Zhao, Luo, Yang, Long, Chang & Chen, 2023: 83 — China (Guizhou).

Neomohunia Chen & Li, 2007 in Chen, Li & Yang, 2007: 372

Type species: *Mohunia pyramida* Li & Chen, by original designation.

N. longispina Luo, Yang & Chen, 2018b: 104 — China (Guizhou).

N. pyramida (Li & Chen, 1998: 123) — China (Guizhou).

N. sinuatipennis Luo, Yang & Chen, 2018a: 108 — China (Guizhou).

Paramohunia Chen & Li, 2007 in Chen, Li & Yang, 2007: 373

Type species: *Mohunia notata* Li & Chen, by original designation.

P. notata (Li & Chen, 1998: 125) — China (Guizhou).

Pseudomohunia Li, Chen & Zhang, 2007: 87

Type species: *Pseudomohunia nigrifascia* Li, Chen & Zhang, by original designation.

P. nigrifascia Li, Chen & Zhang, 2007: 88 — China (Guizhou).

Scaphotettix Matsumura 1914: 227.

Type species: *Scaphotettix viridis* Matsumura, by original designation.

S. bispinosus Dai & Zhang, 2009 in Dai, Viraktamath, Zhang & Webb 2009: 657 — China (Hunan, Hubei).

S. striatus Dai & Zhang In Dai, Viraktamath, Zhang & Webb 2009: 658–659, figs 1B, 1F, 3A–I. — China (Fujian, Yunnan, Hainan, Hunan, Taiwan); Indonesia; Sri Lanka.

S. viridis Matsumura 1914: 227–228, figs 10, 1–4. — China (Hainan); India.

Tiaobeinia Chen & Li, 2008 in Chen, Li & Yang, 2008: 302.

Type species: *Tiaobeinia bisubula* Chen & Li, by original designation.

T. bisubula Chen & Li, 2008 in Chen, Li & Yang, 2008: 302 — China (Guizhou).

T. coarseata **sp. nov.** — China (Shaanxi).

T. emeiensis Chen & Yang, 2008 in Chen, Li & Yang, 2008: 304 — China (Sichuan).

T. wantuia Chen, Yang & Li, 2012: 97 — China (Hunan, Guizhou).

T. yuani **sp. nov.** — China (Gansu).

Genus *Tiaobeinia* Chen & Yang, 2008

Tiaobeinia Chen & Li, 2008: 302. Type species: *Tiaobeinia bisubula* Chen & Li, 2008.

For the relationships and diagnosis of *Tiaobeinia* see Chen *et al.* 2008: 302.

Distributions. China (Gansu, Guizhou, Shaanxi).

Remarks. The genus can easily be recognized by the shape of the head, wing venation and male genitalia. Among the genera of Mukariini with an elongate male pygofer, it can be easily recognized by a well-developed dorsal inner pygofer process. Chen *et al.* (2008) considered this genus closely related to *Flatfronta* from which it can be differentiated by wing venation, hind

femur formula, Y-shaped connective, short dorsoartium of the aedeagus. *Tiaobeinia emeiensis* was described by Chen & Li (2008) based on a female specimen and later the male genitalia was illustrated by Chen *et al.* (2012). *T. emeiensis*, *T. coarseata* **sp. nov.** and *T. yuani* **sp. nov.** are similar to each other and slightly different from type species and *T. wantuia* by: face with upper part tumid in profile, style with apophysis short, pygofer with an inner arcuate dorsal process on dorsal margin, connective linear-shaped. They are only tentatively retained in this genus and may form new genera.

Key to species of the genus *Tiaobeinia* (males)

1. Connective anterior arms closely appressed, linear-shaped 2
- Connective anterior arms somewhat divergent, Y-shaped 4
2. Crown with an orange central longitudinal band dorsally, extending from apex to base of crown, forked on pronotum 3
- Crown without orange central longitudinal band dorsally *T. yuani* **sp. nov.**
3. Aedeagal shaft with apical lateral processes *T. emeiensis*
- Aedeagal shaft with apex truncate, without apical process *T. coarseata* **sp. nov.**
4. Pygofer side without small denticles medio-posteriorly, caudal process almost equal to height of pygofer side; apophysis of style with apex distinctly curved inwards; aedeagal shaft truncated apically *T. wantuia*
- Pygofer side with small denticles medio-posteriorly, caudal process shorter than 1/2 height of pygofer side; apophysis of style straight; aedeagal shaft rounded apically *T. bisubula*

1. *Tiaobeinia coarseata* **sp. nov.** (Fig. 1)

Description. Body length: male, 3.9 mm.

General coloration pale yellowish white. Crown with an orange central longitudinal band dorsally, extending from apex to base of crown, forked on pronotum, reaching to lateral margin of scutellum, pronotum with two pale orange bands on lateral marginal area (Figs 1A, 1B). Forewing pale yellowish distally, with an orange stripe along outer side of claval suture and a transverse band across middle of forewing, and a brown marking on inner apical cell along inside of vein M3+4 (Figs 1A, 1B).

Head slightly narrower than pronotum (Fig 1A). Crown a little shorter than pronotum, conically rounded in front of eyes, and two subocellar transverse carinae, more than half as long as broad between eyes (Fig. 1A). Face including eyes wider than long, upper part of face tumid in profile (Fig. 1C); frontoclypeus flat, horizontal, gradually widening dorsally; clypellus parallel-sided, convex, exceeding normal curve of gena; lorum long and narrow (Fig. 1C). Pronotum slightly less than 2× as broad as long, convex, smooth, anterior margin convex, posterior margin concaved, longer than median length of crown and also mesonotum, lateral margins carinate. Mesonotum transversely faintly rugose, basal triangles granulose. Forewing with 3 subapical and 4 apical cells, appendix well-developed (Figs 1A, 1B).

Male genitalia. Pygofer elongate with length longer than height in lateral view (Fig. 1F), with macrosetae on posteroventral margin, dorsal margin sclerotized in mid region with an inner arcuate dorsal process curved posteroventrally (Fig. 1D). Valve broad anteriorly and narrowed posteriorly, posterior margin rather straight (Fig. 1E). Subgenital plates triangular with basal width shorter than length, with several submarginal rows of macrosetae along with hair-like setae (Fig. 1E). Style with well-developed preapical lobe, apophysis short, laterally curved and ventrally sculptured (Figs 1G, 1H). Connective with arms line-shaped, stem long,

fused with aedeagus (Fig. 1I). Aedeagus broad basally, shaft short and stout, slightly curved dorsally, with ventral margin extending laterally and narrowed dorsally, apex truncate, gonopore subapical (Figs 1I, 1J).

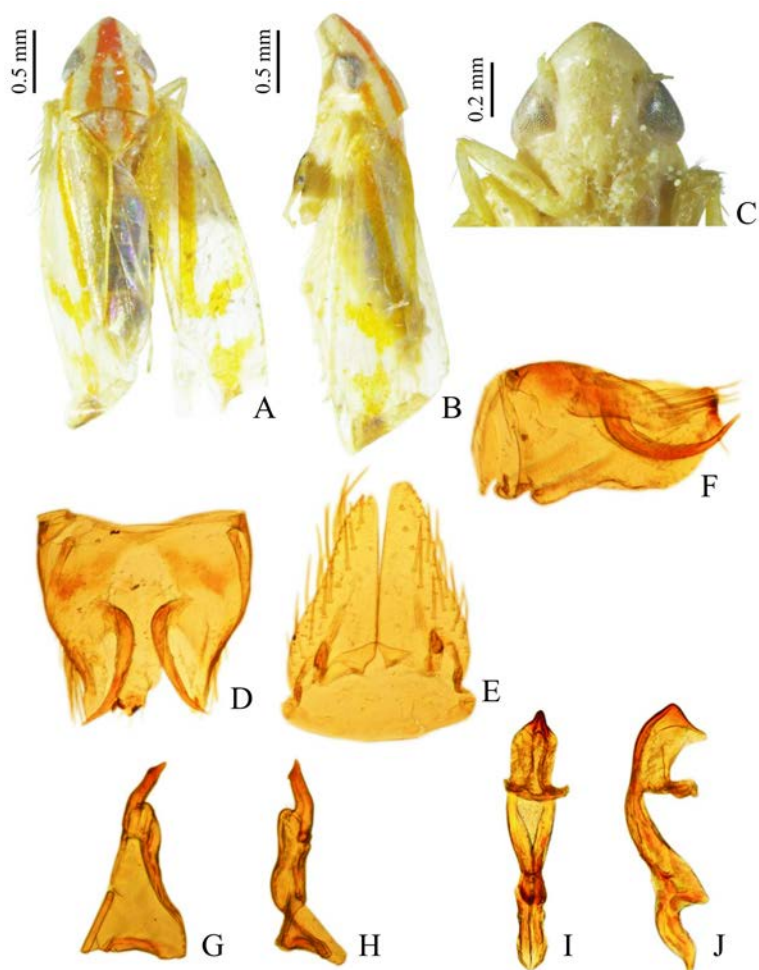


Figure 1. *Tiaobeinia coarseata* sp. nov., ♂. A, B. Male habitus, dorsal and lateral view; C. Face; D. Pygofer side, ventral view; E. Valve and subgenital plates, ventral view; F. Pygofer side, lateral view; G, H. Style, dorsal and lateral views; I, J. Aedeagus and connective, dorsal and lateral view.

Holotype. ♂, China, Shaanxi, Liuba, Moutaizi, 19-VII-1995, Wenzhu ZHANG & Liyun REN leg.

Host Plant. Bamboo.

Etymology. This new species is named for the aedeagus having ventral margin extending laterally.

Remarks. The new species is similar to *Tiaobeinia emeiensis* Chen & Yang, 2008 in external appearance, but differs from the latter by aedeagal shaft with apex truncate, without apical process.

2. *Tiaobeinia yuani* sp. nov. (Fig. 2)

Description. Body length: male, 4.08 mm.

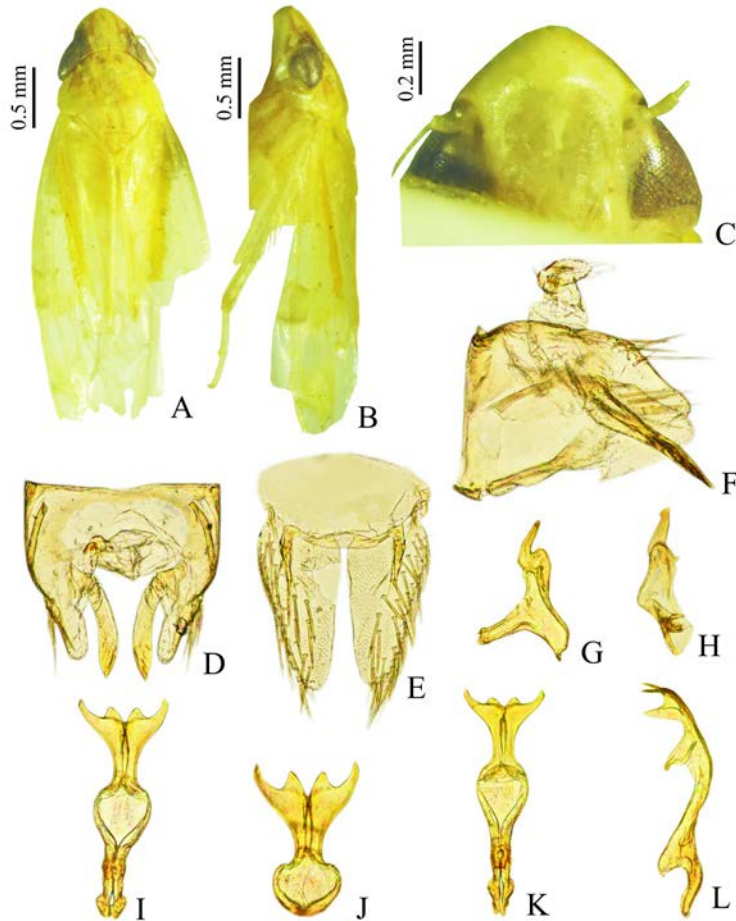


Figure 2. *Tiaobeinia yuani* sp. nov., ♂. A, B. Male habitus, dorsal and lateral view; C. Face; D, F. Pygofer side, dorsal and lateral views; E. Valve and subgenital plates, ventral view; G, H. Style, dorsal and lateral views; I, K, L. Aedeagus and connective, caudal, ventral and lateral view; J. Aedeagus, caudal view.

General coloration pale yellowish white (Figs 2A–C). Crown with two pale light brown longitudinal bands laterally (Figs 2A, 2B). Forewing pale yellowish white, with a yellow stripe along inner side of claval suture and a transverse band across middle of forewing, and a brown marking on inner apical cell along inside of vein M3+4 (Figs 2A, 2B).

Male genitalia. Pygofer elongate with length longer than height in lateral view, with macrosetae on posteroventral margin (Fig. 2F), dorsal margin sclerotized in mid region with an inner arcuate dorsal process directed posteroventrally (Fig. 2D). Valve broad anteriorly and narrowed posteriorly, posterior margin rather straight (Fig. 2E). Subgenital plates triangular with basal width shorter than length, with several submarginal rows of macrosetae along with hair-like setae (Fig. 2E). Style with well-developed preapical lobe, apophysis short, laterally curved and ventrally sculptured (Figs 2D, 2H). Connective with arms line-shaped, stem long, fused with aedeagus (Figs 2I, 2K). Aedeagus broad basally, shaft short, slightly curved dorsally,

with caudal margin extending laterally with two processes, apex with two triangular lobes, gonopore subapical (Figs 2I–L).

Holotype. ♂, **China**, Gansu, Chengxian, Baiyun Mountain, 29-VII-2002, Zhaofu YANG & Cong WEI leg.

Host Plant. Bamboo.

Etymology. This species is named after Prof. Feng YUAN, Northwest A&F University, China, for his contributions to the study of treehoppers.

Remarks. This species can be easily distinguished from other species by crown without orange central longitudinal band dorsally. It is very similar to *T. emeiensis* in male genitalia but differs from the latter by dorsal processes of pygofer side straight, aedeagus apex with two triangular lobes, shorter than lateral processes.

Acknowledgements

This study was supported by the National Natural Science Foundation of China (32070479; 32270497) and National key Research and Development Program "Intergovernmental Cooperation on International Science and Technology Innovation" Special Project (2022YFE0115200).

References

- Cai P & Kuoh Z. 1996. Three new species of Nirvanidae from China (Homoptera: Cicadelloidea). *Acta Entomologica Sinica*, 39(2): 186–190.
- Cao YH, Dietrich CH, Zahniser JN & Dmitriev DA. 2022. Dense sampling of taxa and characters improves phylogenetic resolution among Deltocephaline leafhoppers (Hemiptera: Cicadellidae: Deltocephalinae). *Systematic Entomology*, 47(3): 430–444.
- Chen X & Li Z. 1997. A new genus and species of Nirvaninae (Homoptera: Cicadellidae). *Entomotaxonomia*, 19(3): 169–172.
- Chen XS, Li ZZ & Yang L. 2008. Oriental bamboo leafhoppers: A new genus and two species of Mukariinae (Hemiptera: Cicadellidae) from Southwest China and notes on related group. *Annales de la Société Entomologique de France* (n. s.), 44(3): 301–307.
- Chen XS, Li ZZ & Yang L. 2007. Oriental bamboo leafhoppers: revision of Chinese species of *Mohunia* (Hemiptera: Cicadellidae: Mukariinae) with descriptions of new genera and new species. *Annals of the Entomological Society of America*, 100(3): 366–374.
- Chen XS, Liang AP & Li ZZ. 2009. A new species of bamboo leafhopper genus *Mukaria* (Hemiptera, Cicadellidae, Mukariinae) from Guangdong, China. *Acta Zootaxonomica Sinica*, 34(1): 144–147.
- Chen XS, Yang L & Li ZZ. 2012. *Bamboo-feeding Leafhoppers in China*. China Forestry Publishing House, Beijing, 218 pp.
- Dai W, Viraktamath CA, Zhang YL & Webb MD. 2009. A review of the leafhopper genus *Scaphotettix* Matsumura (Hemiptera: Cicadellidae: Deltocephalinae), with description of a new genus. *Zoological Science* (Tokyo), 26(9): 656–663.
- Dietrich CH. 2005. Keys to the families of Cicadomorpha and subfamilies and tribes of Cicadellidae (Hemiptera: Auchenorrhyncha). *Florida Entomologist*, 88(4): 502–517.
- Distant WL. 1908. *Rhynchotha*. IV. Homoptera and appendix (Pt.). *The fauna of British India, including*

- Ceylon and Burma*. Taylor & Francis, London, 501 pp.
- Evans JW. 1947. A natural classification of leafhoppers (Jassoidea, Homoptera). Part 3. Jassidae. *Transactions of the Royal Entomological Society of London*, 98(6): 105–271.
- Kuoh CE & Kuoh JE. 1983. A new species of the genus *Mukaria* (Homoptera: Cicadelloidea: Nirvanidae). *Acta Entomologica Sinica*, 26(1): 78–79.
- Li ZZ & Chen X. 1998. *Nirvaninae from China (Homoptera: Cicadellidae)*. Guizhou Science and Technology Publishing House, Guizhou, 149 pp.
- Li ZZ, Chen X & Zhang B. 2007. Descriptions of a new genus and species of leafhopper (Hemiptera: Cicadellidae: Mukariinae) attacking *Chimonobambusa* (Gramineae: Bambusoidea) from Guizhou Province, China. *Scientia Silvae Sinicae*, 43(10): 87–89.
- Linnavuori R & Quartau JA. 1975. Revision of the Ethiopian Cicadellidae (Hemiptera - Homoptera): Iassininae and Acroponinae. *Etudes du Continent Africain*, 3: 1–170.
- Luo Q, Yang L & Chen XS. 2019. Two new species of the bamboo-feeding subgenus *Myittana* (*Benglebra*) from China (Hemiptera: Cicadellidae: Deltocephalinae). *Zootaxa*, 4646(1): 164–172.
- Luo Q, Yang L & Chen XS. 2018a. Review of the bamboo-feeding genus *Agrica* Strand (Hemiptera: Cicadellidae: Deltocephalinae), with description of two new species from China. *Zootaxa*, 4418(1): 75–84.
- Luo Q, Yang L & Chen XS. 2018b. Review of the bamboo-feeding leafhopper genus *Neomohunia*, with descriptions of two new species from China (Hemiptera, Cicadellidae, Deltocephalinae, Mukariini). *ZooKeys*, 790: 101–113.
- Mahmood SH & Ahmed M. 1969. Studies of tribe Alebrini (Typhlocybinae: Cicadellidae) in East Pakistan. *Sind University Research Journal Science Series*, 4(1-2): 85–91.
- Matsumura S. 1912. Die Acocephalinen und Bythoscopininen Japans. *The Journal of the Sapporo Agricultural College*, 4(7): 279–325.
- Matsumura S. 1914. Die Jassinen und einige neue Acocephalinen Japans. *The Journal of the Sapporo Agricultural College*, 5(7): 165–240.
- Oman PW, Knight WJ & Nielson MW. 1990. *Leafhoppers (Cicadellidae): a bibliography, generic check-list and index to the world literature 1956–1985*. CAB International Institute of Entomology, Oxon, 368 pp.
- Strand E. 1942. Miscellanea nomenclatorica zoologica et palaeontologica. X. Folia Zoologica et Hydrobiologica. *Organ des Systematisch-Zoologischen Instituts und der Hydrobiologischen Station der Universität Lettlands*, 11: 386–402.
- Viraktamath CA & Webb MD. 2019. Revision of the bamboo leafhopper tribe Mukariini (Hemiptera: Cicadellidae: Deltocephalinae) from the Indian subcontinent with description of new genera and species. *Zootaxa*, 4547(1): 1–69.
- Yang L & Chen XS. 2011. Review of bamboo-feeding leafhopper genus *Mukaria* Distant (Hemiptera: Cicadellidae: Mukariinae) with description of a new species from China. *Zootaxa*, 2882: 27–34.
- Yang L, Chen XS & Li ZZ. 2016. *Bambusimukaria*, a new bamboo-feeding leafhopper genus from China, with description of one new species (Hemiptera, Cicadellidae, Deltocephalinae, Mukariini). *ZooKeys*, 563: 21–32.
- Zahniser JN & Dietrich CH. 2013. A review of the tribes of Deltocephalinae (Hemiptera: Auchenorrhyncha: Cicadellidae). *European Journal of Taxonomy*, 45: 1–211
- Zhao YT, Luo Q, Yang L & Chen XS. 2024. Review of bamboo-feeding leafhoppers of the genus *Mukaria* (Hemiptera: Cicadellidae: Deltocephalinae) in China, with description two new species. *Zootaxa*, 5474(3): 259–270.
- Zhao YT, Luo Q, Yang L, Long JK, Chang ZM & Chen XS. 2023. Two new species of the bamboo-feeding subgenus *Myittana* (*Benglebra*) (Hemiptera: Cicadellidae: Deltocephalinae) from China. *Zootaxa*, 5244(1): 82–88.